Art. XVII.—*On the Extinction of Waves at the Entrance of Harbours.*

By Edward Davy, L.S.A., M.R.C.S.

[Read 11th December, 1884.]

To prevent the access of a heavy sea into a shipping harbour has always been a desideratum. This object can be accomplished by means of what is called a breakwater—namely, a strong stone wall, built up from the bottom of the sea; and what has been called a floating breakwater, as a cheap substitute, is probably a fallacy.

If a principle can be pointed out by which, at an enormously smaller expense, the same object can be even partially obtained, there is no doubt a benefit would be conferred on the world. I therefore offer the following in the hope that others capable of reasoning correctly on the matter will take the subject up.

The contrivance which I propose, and which, provisionally, I will call a Wave Extinguisher, consists of three parts—

First, a float.
Second, a moorage.
Third, a tether.

I shall describe the contrivance as a unit, on the understanding that any number of them may be required for use.

First, the Float.—The float may be a log of light wood, or hollow barrel of air, made of whatever material will suit.

The Moorage may be a basket of durable wood at the bottom of the sea, sufficiently loaded with stones (with the aid of the tether) to prevent the float from rising with the waves.

The Tether will be a rope or chain of the length to be required, according to circumstances. Now, it will appear that on the approach of a wave the float, being so confined, will be unable to rise with or to the top of it, and will consequently be submerged in it; in so doing, it becomes, for the time being, a part and parcel of that wave—displacing water which thus takes its place in the trough between the waves. As the wave passes on it is, of course, lessened by a bulk equal to that of the float it has left behind it.

To carry this simple principle out for practical purposes, we have now to come to other considerations. Let us suppose the apparent height of a wave, as seen from a boat in the bottom of the trough, to be twenty feet; now, as half of this elevation belongs to the trough, the actual height of the wave above the mean level of the sea is only ten feet; supposing the sides to be inclined at an angle of forty-five degrees, the area of a transverse section of that wave will be one hundred square feet; and that area, multiplied by the length, will give the solid bulk of all the floats required to extinguish it.

A number of these elements in a double or multiplied row would probably be more convenient than a few large ones, and the construction, not being continuous, might be carried out progressively until sufficiently effective.

One advantage in contradistinction to a sea stone wall would be, that the depth of the water would make very little difference in the expense—being a question of length of tether only.

Among the obvious objections to the scheme must be mentioned the variations of tide—the length of tether suiting one tide not being suitable for another. In reference to this point, it would seem more important to provide against waves at high tides than at low ones; but in any case this is only a question of multiplying the elements, or altering the form of the floats, probably by lengthening in the perpendicular direction.

However, the scheme, such as it is, is at the service of the public, and I cannot help believing that the time will come when some good will arise out of it.
